

## SEMICONDUCTOR PACKAGE WITH A HEAT SPREADER

### Field of the Invention

5           The present invention relates to a semiconductor package; and, more particularly, to a semiconductor package with a heat spreader capable of efficiently spreading heat generated therein.

### 10   Background of the Invention

          In a conventional package such as a plastic type package or a ball grid array ("BGA") type package, one chip is loaded in one package so that it is required to increase  
15   a size of the package in order to improve its functions. As the size of the package becomes larger, there are caused some problems such as a space utilizing problem and a heat spreading problem.

          Heat generated in the package is spreaded by a heat  
20   spreader therein. In other words, the heat generated by the chip is dissipated to surroundings by the heat spreader made of a thin iron plate. However, in a chip which performs various functions, the heat may not be sufficiently spreaded merely by such heat spreader.

25           Further, because one chip is loaded in one package in the conventional semiconductor package, the size of the

package should be increased in order to perform various functions.

As a result, in the conventional semiconductor package, the various functions thereof are not properly performed and the heat spreading is not efficiently accomplished due to a limited size of the package.

#### Summary of the Invention

It is, therefore, an object of the present invention to provide a semiconductor package with a heat spreader capable of efficiently utilizing a space in the package and maximizing a heat spreading efficiency by loading chips to an upper part and a lower part of the package, respectively, and providing a thermally conductive member which connects a heat spreader to both of the upper and the lower chip.

In accordance with a preferred embodiment of the present invention, there is provided a semiconductor package with a heat spreader, including:

- an upper PCB connected to a first chip;
- a lower PCB connected to a second chip;
- a heat spreader for spreading heat generated by the first chip and the second chip to surroundings; and
- thermally conductive members for transmitting the heat generated by the first chip and the second chip to the heat spreader by connecting the heat spreader to the first chip

and the second chip.

In accordance with another preferred embodiment of the present invention, there is provided a semiconductor package with a heat spreader, including:

- 5       a lead frame connected to a first chip;
- a lower PCB connected to a second chip;
- a heat spreader for spreading heat generated by the first chip and the second chip to surroundings; and
- thermally conductive members for transmitting the heat
- 10       generated by the first chip and the second chip to the heat spreader by connecting the heat spreader to the first chip and the second chip.

#### Brief Description of the Drawings

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The above and other objects and features of the present invention will become apparent from the following description of preferred embodiments, given in conjunction with the accompanying drawings, in which;

- 20       Fig. 1 illustrates a cross sectional view for showing a semiconductor package with a heat spreader in accordance with a preferred embodiment of the present invention; and

- Fig. 2 depicts a cross sectional view for showing a semiconductor package with a heat spreader in accordance
- 25       with another preferred embodiment of the present invention.

### Detailed Description of the Preferred Embodiments

A preferred embodiment of the present invention will now be described in detail with reference to the accompanying drawings, wherein like reference numerals  
5 appearing in the drawings represent like parts.

Referring to Fig. 1, a semiconductor package in accordance with the present invention includes a PCB 10, balls 13, a heat spreader 14 and thermally conductive  
10 members 15. The PCB 10 is divided into an upper PCB and a lower PCB, wherein the upper and the lower PCB are connected to an upper chip 11 and a lower chip 12 by using, e.g., gold bumps, respectively.

The heat spreader 14 functions to spread heat  
15 generated by the upper chip 11 and the lower chip 12.

The thermally conductive members 15 connect the heat spreader 14 to the upper chip 11 and the lower chip 12, thereby transmitting the heat generated by both of the upper chip 11 and the lower chip 12 to the heat spreader 14. Each  
20 of the thermally conductive members 15 may be, e.g., a disk-shaped metallic elastic body such as a disk spring and may be curved to form gaps between the heat spreader 14 and the upper chip 11 and between the heat spreader 14 and the lower chip 12.

25 At this time, the space in the package including the gaps is filled with epoxy mold compound ("EMC"). The heat

generated by the upper chip 11 and the lower chip 12 may also be spreaded to the heat spreader 14 through the EMC.

Referring to Fig. 2, there is shown a semiconductor package with a heat spreader in accordance with another preferred embodiment of the present invention. The semiconductor package of the second preferred embodiment includes a PCB 110, balls 113, a heat spreader 114, thermally conductive members 115 and a lead frame 116.

The PCB 110 is connected to a lower chip 112 by using, e.g., gold bumps and the lead frame 116 is connected to an upper chip 111 by, e.g., a wire bonding.

The heat spreader 114 functions to spread the heat generated by the upper chip 111 and the lower chip 112.

The thermally conductive members 115 connect the heat spreader 114 to the upper chip 111 and the lower chip 112, thereby transmitting the heat generated by both of the upper chip 111 and the lower chip 112 to the heat spreader 114. Each of the thermally conductive members 115 may be, e.g., a disk-shaped metallic elastic body such as a disk spring and may be curved to form gaps between the heat spreader 114 and the upper chip 111 and between the heat spreader 114 and the lower chip 112. Also, the space in the package including the gaps is filled with the EMC.

In accordance with the present invention, the semiconductor package can maximize its functions and extend a life time thereof by efficiently spreading the heat

generated therein while maintaining its size unchanged.

While the invention has been shown and described with respect to the preferred embodiments, it will be understood by those skilled in the art that various changes and  
5 modifications may be made without departing from the spirit and scope of the invention as defined in the following claims.